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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

TULAREMIA SPREAD BY RODENTS

The recurrent epizootic disease recently described under the name tularemia, which kills off wild rabbits in great numbers, has been a subject of interest for many years. It is not only a striking natural phenomenon that appears to occur among wild rabbits more or less periodically, but it also serves as a natural means to reduce the numbers of these rodents and thus affords a measure of relief from the damage that they do to orchards, vineyards, farm crops, and range grasses. The disease is carried by jack rabbits, snowshoe rabbits, and cottontails, and also by certain species of ground squirrels, and occasionally by other animals.

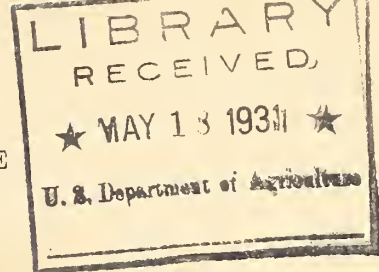
Interest in tularemia has been greatly increased through the discovery by investigators of the United States Public Health Service that it is transmitted to man by the bite of blood-sucking flies and ticks, and by contact with diseased animals. In man the disease usually begins suddenly, often occurring while the person is at work. The usual symptoms are headaches, chills, bodily pains, vomiting, prostration, and fever, followed by painful swelling and later suppuration of glands. It is a disabling disease, incapacitating the patient for weeks or months and at times terminating fatally. Cases of tularemia have occurred in more than half the States from the Atlantic to the Pacific and from Canada to the Gulf. This distribution indicates that the disease probably occurs throughout most of the United States and that its recognition in other States will be only a matter of time.

Tularemia, or "rabbit fever," or "deer-fly fever," as the disease is also locally called, is transmitted from rabbit to rabbit in nature by the rabbit tick and the rabbit louse. These insects carry or transfer the infection throughout the year and thus keep it constantly alive. It becomes apparent, therefore, that the disease is persistent and that the striking epizootics are merely extraordinary manifestations of it due to the presence of unusual numbers of wild rabbits. Not only may the disease be transmitted from rodents to man through the bite of flies and ticks, but it also is directly transmitted in handling and otherwise coming in touch with the blood and internal organs of infected rodents. Many persons have become infected by dressing wild rabbits for the table, or by cutting them up for fish bait or for feed for poultry, swine, or other domestic stock.

The Biological Survey calls attention to the situation in order that persons exposed to the disease may observe necessary precautions to prevent possible infection.

Bi-903
Jan. '28.

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TULAREMIA, AN ANIMAL-BORNE DISEASE

The disease "tularemia" has assumed such proportions in the United States that it appears desirable that the Biological Survey issue a statement summarizing the available information and the procedure that may be recommended by field representatives of the Bureau in their work with the public. The information here presented has been endorsed by the Surgeon General of the United States Public Health Service, and the recommendations made are concurred in by him.

NATURE AND HISTORY OF THE DISEASE:

Tularemia is a plague-like disease of rodents transmissible to man. It was originally discovered in ground squirrels in California in 1910 by Dr. G. W. McCoy, of the United States Public Health Service. Later (1919) it was found in jack rabbits in Utah, in the work of Dr. Edward Francis and his assistants of the Public Health Service, and was definitely established as the debilitating, disabling, and frequently fatal disease locally known as "deer-fly fever," which was affecting residents and visitors locally in certain country districts in Utah. Of 500 human cases reported in the United States, 20 have terminated in death.

Positive diagnosis of the disease, isolation of the causative organism Bacterium tularense, and development of a successful cultural technique were important steps in the history of tularemia and of investigations of wild animals as carriers of this disease. Later work has disclosed human cases of the disease in all States except Washington, Wisconsin, New York, Delaware, and the New England States, twenty-five States having been added to the list in the two years 1925 and 1926, and four in 1927. The disease has also been definitely established as identical with the rabbit-borne disease in Japan, known as Ohara's disease, which affects people there.

Discovery of tularemia has cleared up many puzzling cases of illness that in the past have doubtless been wrongly diagnosed as "flu," septic infection, blood poisoning, or other kindred diseases, because of a superficial resemblance of the symptoms at some stage of the disease. Human cases have been traced to rabbits or other animals in the locality or to shipments of diseased animals sold in the public markets. This specific knowledge lays the foundation for intelligent action in maintaining essential safeguards and in protecting the public in the use of important game animals.

Among game animals tularemia occurs in nature in jack rabbits, snowshoe rabbits, and cottontail rabbits, and is responsible for some of the periodic epizootics that kill them off locally in great numbers. This provides a reservoir for infection of both wild animals and human beings. In the Western States the disease is carried from animal to animal and to man by the bites of infected deer flies and ticks, and ticks also transmit the infection to man in the Southern States. Ticks carry the infection through the winter, and the females transmit it through the eggs to the next generation. Man also becomes infected by handling rabbit carcasses, as in dressing them for the table or cutting them up for such purposes as feed for dogs, hogs, foxes, or chickens, or as bait for fish or such carnivorous animals as coyotes. In the Eastern States direct contact in dressing the carcasses is the common means of infection.

SYMPTOMS OF THE DISEASE IN MAN:

Tularemia is likely to manifest itself first by pain, tenderness, and swelling of lymph glands draining the region where the infection occurs, as those of the elbow or armpit when infection has occurred on the finger. These symptoms will probably occur within two to five days after infection. An inflamed and painful ulcer may soon appear at a point where an insect bite occurred, or at an abrasion in the skin where the infection has gained entrance. This may be accompanied by sudden onsets of headache, aching pains, chills, prostration, general weakness, and fever. In some cases no external lesions are found.

SYMPTOMS IN WILD RABBITS:

In wild rabbits a spotting of the liver and spleen with yellowish or whitish flecks is one of the most characteristic and easily recognized symptoms. Stupor or evidence of sickness in a rabbit should be regarded with suspicion, especially if an epizootic disease is prevalent. Diagnosis is made by inoculating guinea pigs or other susceptible animals with spleen or liver of a suspected rabbit or other wild animal and then examining a culture isolated after the animals used in the experiments sicken or die.

OTHER ANIMALS KNOWN TO BE SUSCEPTIBLE:

In addition to wild rabbits and hares, the California ground squirrel, Columbia ground squirrel, Utah ground squirrel, desert ground squirrel, pine squirrel, yellow-bellied chipmunk, pocket gopher, woodchuck, opossum, cat, porcupine, house mouse, deer mouse,

meadow mouse, wood rat, and the coyote have all been found susceptible to tularemia in a fatal form. The extent to which other rodents, important fur-bearers, and predacious animals and such valuable game birds as grouse are susceptible to the disease is being investigated. Domestic rabbits also are susceptible under laboratory conditions, but no cases of tularemia have yet been recognized in commercial rabbitries. Care should be exercised to avoid its introduction into such places. There is no danger of contracting tularemia from eating rabbit meat if it is thoroughly cooked, even though the animal may have been infected.

PROTECTIVE MEASURES:

No protective vaccine has thus far been determined nor has any treatment with serum or drugs been found effective against tularemia. Care should be exercised when in the open to avoid so far as possible bites of deer flies, ticks, or other known carriers of the infection, particularly in an area where an epizootic of tularemia is known to exist. The use of rubber gloves when handling or dressing rabbits, or when skinning other animals that may be infected with the disease, in order to avoid contact with the blood or the visceral organs, is the best known protection against human infection. This is not an absolute protection, however, as skilled laboratory workers who maintain the most careful precautions when handling carcasses and entrails frequently become infected. The same precautions should be followed in handling fresh skins. It is unlikely that skins that have been thoroughly dried over a period of three or four weeks will continue to carry the infective organism. One attack of tularemia confers immunity to man. Immunes, therefore, should be employed where possible in occupations involving risk of infection.

QUARANTINE:

In many parts of the country there is much interest in liberating wild rabbits to restock hunting areas, and these animals have been obtained from States where tularemia is now known to have been prevalent periodically. Where such importation for restocking purposes appears desirable, it is important that effective quarantine be maintained to prevent introduction of diseased animals into localities where tularemia is not present or in which there is no manifestation of the disease in epizootic form. Present information indicates that maintenance of a quarantine of wild rabbits for at least ten days is an essential safeguard. Infected wild rabbits are likely to die within a period of five or six days, although they may not invariably do so. Rabbits that die after capture, during shipment, or while held in quarantine should be carefully examined by persons capable of recognizing tularemia or other diseases, in order that the exact cause of death may be diagnosed.

